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## Reconstruction and Analysis of High Resolution Precipitation Dataset

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**Abstract:** A long historical record of global high-resolution precipitation measurements is valuable for multiple uses. These include calibration and validation of numerical weather and climate models, improved description and understanding of energy and water cycle variations and distribution, and both improved documentation of past hydroclimatic trends as well as improved prediction. Despite stronger evidence of hydrologic cycle intensification (IPCC, 2007), whether such intensification has been and/or will be accompanied by measureable changes in the frequency of hydrologic extremes such as floods and droughts requires long-term global precipitation observations at spatial and temporal resolutions high enough to capture these extreme events.

The availability of satellite observations has led to algorithms and precipitation data sets that provide global coverage. Leading data sets such as the Global Precipitation Climatology Project (GPCP) and NOAA's Climate Precipitation Center Merged Analysis of Precipitation are widely used. However, the resolution of these data sets – typically 2.5° (spatial) and monthly (temporal) resolutions – limits their capacity to capture and describe extreme precipitation events. High quality measurements from Low Earth Orbital (LEO) satellites in recent years have improved both spatial and temporal resolutions. For example, since 1997 the current version of the GPCP (V2.1) data includes a subset of TRMM and other LEO satellite-based 1° daily (GPCP-1DD) data. For climatological studies, however, longer historical data at high spatial and temporal resolution for the period of pre-1997 are needed.

Researchers in the UCI Center for Hydrometeorology & Remote Sensing (CHRS) propose to produce a long (25+ years) record of high-resolution global precipitation measurements. Our main objective: within a global climatic context, to contribute to the understanding of precipitation variability at spatial and temporal scales relevant to extreme events. To accomplish our goal, we will first retrospectively process satellite-based high-resolution precipitation data going back to 1983. Then, we will assess the ability of the data set data to capture extreme rainfall events using appropriate verification techniques. The proposed product will use global GEO satellites and GPCP monthly measurements to develop a 0.25° daily precipitation data set for the region (-50° +50°). Finally, we will analyze the data to investigate possible trends in intensity and frequency of extreme precipitations as well as their relationship to the local and regional temperature anomaly during the available period. The availability of a long-term fine spatial and temporal scale precipitation data set will contribute to the calibration of the next generation of high-resolution numerical weather prediction and climate models, which must address hydrologically relevant scales.